

**Specific Emergency Exemption for Transform® WG Insecticide (sulfoxaflor)
to control the sugarcane aphid, *Melanaphis sacchari* in sorghum in Illinois**

Type of Exemption - Illinois Section 18; Specific Exemption Request; submission date July 3, 2018.

This is an application for a specific exemption to authorize the use of Sulfoxaflor (Transform® WG Insecticide EPA Reg. No. 62719-625) to control the sugarcane aphid, *Melanaphis sacchari* in sorghum. The following information is submitted in the format indicated in the rules for Chapter 1, Title 40 CFR, Part 166.

SECTION 166.20(a)(1): IDENTITY OF CONTACT PERSONS

- i. The following are the contact persons responsible for the administration of the emergency exemption:

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- ii. The following qualified experts are also available to answer questions:

Name: Dr. Nicholas Seiter
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SECTION 166.20(a)(2): DESCRIPTION OF THE PESTICIDE REQUESTED

i. **Common Chemical Name (Active Ingredient):** Sulfoxaflor

Brand/Trade Name and EPA Reg. No.: Transform® WG Insecticide,
EPA Reg. No. 62719-625 (Attachment 1)

Formulation: Active Ingredient 50%

SECTION 166.20(a)(3): DESCRIPTION OF THE PROPOSED USE

i. **Sites to be treated:**

Sorghum fields (grain and forage) infested with the sugarcane aphid, *Melanaphis sacchari* located statewide are proposed to be treated.

ii. **Method of Application:**

The proposed method of application will be a foliar spray when sugarcane aphid populations are present at an economic threshold of 30% of plants infested.

iii. **Rate of Application:**

The proposed rate of application is 1.0 – 1.5 oz of Transform® WG/acre (0.023 – 0.047 lb ai/acre).

iv. **Maximum Number of Applications:**

The proposed maximum number of applications is two applications per year at 1.0-1.5 oz/ac with a maximum of 3 oz/acre (0.094 lb ai/acre)

v. **Total Acreage to be Treated:**

Based on information from the National Agricultural Statistics Service, approximately 15,000 acres of grain sorghum were harvested in Illinois in 2017. An additional 1,000 acres of sorghum were harvested as silage. An estimated 22,000 acres of sorghum have been planted in Illinois in 2018.

Total Amount of Pesticide to be used:

The maximum potential use of Transform WG under this section 18 exemption would be 4,125 pounds of the dry formulated product (2,063 pounds of the active ingredient) if every planted acre of sorghum in Illinois were treated at the seasonal maximum rate. The actual use of this product under the section 18 exemption would be much less than that. Unlike the southern states where sugarcane aphid infestations have been more common, not all sorghum acres in Illinois are predicted to need an insecticide application to control sugarcane aphid. Many acres needing an application would likely receive Sivanto Prime® as an initial application, with Transform WG®

potentially used closer to harvest within the 21 day pre-harvest interval of Sivanto Prime[®].

vi. Restrictions and Requirements:

Refer to the Transform WG[®] container label for first aid, precautionary statements, directions for use and conditions of sale and warranty information. It is a violation of federal law to use this product in a manner that is inconsistent with all applicable label directions, restrictions and precautions found in the container label and this supplemental label. Both the container label and this supplemental section 18 quarantine exemption label must be in the possession of the user at the time of application.

Applicable restrictions and requirements concerning the proposed use and the qualifications of applicators using Transform WG[®] are as follows:

- Pre-harvest Interval: Do not apply within 14 days of harvest for grain or 7 days of harvest for forage or stover.
- Re-Entry Interval (REI): 24 hours
- Minimum Treatment Interval: Do not make applications less than 14 days apart.
- Do not make more than two applications per acre per year.
- Do not apply more than a total of 3.0 oz of Transform WG (0.094 lb ai of sulfoxaflor) per acre per year.

vii. Duration of the Proposed Use:

The duration of the proposed use would extend from July 1, 2018 through November 15, 2018.

viii. Earliest Possible Harvest Date:

The usual beginning harvest date is September 20.

SECTION 166.20(a)(4): ALTERNATIVE METHODS OF CONTROL

i. Registered Alternative Pesticides:

Sivanto Prime[®] (flupyradifurone 17.09%, EPA Reg. No. 264-1141) is currently the only labeled insecticide that consistently exhibits acceptable control against sugarcane aphid. It can be used at reduced rates of 4.0-7.0 oz./acre in Illinois under a supplemental 2(ee) recommendation, and has proven to be effective at these rates for sugarcane aphid control. However, Illinois has not been granted a 24(c) registration to allow a reduced pre-harvest interval for sorghum harvested for grain as several other sorghum-producing states have; therefore, the effective pre-harvest interval for the use of this product in grain sorghum is 21 days. **This precludes the use of Sivanto Prime[®] close to harvest, which is when most observed infestations in Illinois have occurred during the past several years.** Furthermore, the availability of only one active ingredient for control of this insect is a major resistance management concern.

Should resistance to flupyradifurone develop in sugarcane aphid populations, producers in Illinois would be left without a viable alternative rescue treatment.

Other registered alternative pesticides have exhibited, at best, inconsistent control; most of these materials have proven to be ineffective against sugarcane aphid in multiple University field trials. These materials include:

Dimethoate 4 EC (dimethoate 43.5%, EPA Reg. No. 19713-231)

Karate® with Zeon™ Technology (Lambda Cyhalothrin 22.8%, EPA Reg. No. 100-1097)

Lorsban® Advanced, others (Chlorpyrifos 40.2%, EPA Reg. No. 62719-591)

Asana® XL (Esfenvalerate 8.4%, EPA Reg. No. 352-515)

Of the above mentioned insecticides, Karate® and Asana® are pyrethroids and Dimethoate® and Lorsban® are organophosphates. Both pyrethroids and organophosphates have shown resistance potential. In field tests conducted in 2013 by Texas A&M AgriLife professionals, Karate® and Asana® both provided some initial population reduction when used at labeled rates. However, population spikes were observed soon after treatments in some instances. Chlorpyrifos did not provide satisfactory control at labeled rates. Most experiments conducted in the years since this initial trial have shown essentially no control of sugarcane aphids with pyrethroids; in fact, aphid populations are often flared after an application with one of these materials due to removal of natural enemies.

Several resistant sorghum hybrids have been identified by researchers, but little if any information is available on the agronomic performance of these hybrids in Illinois.

Table to Address Issues with Registered Alternatives:

Chemical (active Ingredient)	Application Type (soil, seed, foliar, etc.)	Number of Applications per growing season	Comments- Reason Insecticide Unsuitable
Imidacloprid	Seed	1	While seed treatments are effective for sugarcane aphid control, their efficacy has been shown to last only until late vegetative stages. This does not cover the late reproductive stages that are most likely to be infested in Illinois.
Clothianidin	Seed	1	While seed treatments are effective for sugarcane aphid control, their efficacy has been shown to last only until late vegetative stages. This does

			not cover the late reproductive stages that are most likely to be infested in Illinois.
Thiamethoxam	Seed	1	While seed treatments are effective for sugarcane aphid control, their efficacy has been shown to last only until late vegetative stages. This does not cover the late reproductive stages that are most likely to be infested in Illinois.
Dimethoate	Foliar	3	Provided inconsistent control. Has restriction of no applications during pollen shed due to the toxicity to bees. 28 day PHI
Chlorpyrifos	Foliar	3	Provides inconsistent control. PHI prevents late season application. (30 days PHI of 1 pint/acre, 60 days PHI of 1+ pints/acre)
Lambda Cyhalothrin	Foliar	3 Can only apply twice after crop has emerged and once after is in soft dough stage.	This product provides little to no control of sugarcane aphids. 30 day PHI.
Esfenvalerate	Foliar	1	This product provides little to no control of sugarcane aphids. 21 day PHI.
Turbufos	Soil – Band at planting	1 – 5 cm wide band	This product has not been evaluated for sugarcane aphid control, but is unlikely to provide season long control. Other organophosphates tested have provided, at best, inconsistent control.

ii. Alternative Practices:

Aphid resistant varieties of sorghum have been identified by researchers, but these have not been widely tested for their agronomic performance in Illinois.

SECTION 166.20(a)(5): EFFICACY OF USE PROPOSED UNDER SECTION 18

A wide variety of field experiments conducted in multiple states since sugarcane aphids were first discovered infesting grain sorghum in the U.S. have demonstrated that Transform WG provides acceptable efficacy under most scenarios at a rate of 1.0-1.5 oz./acre; one example from southeast Arkansas is provided in Fig. 1. A letter of support from the University of Illinois Extension, Dr. Nick Seiter, is included.

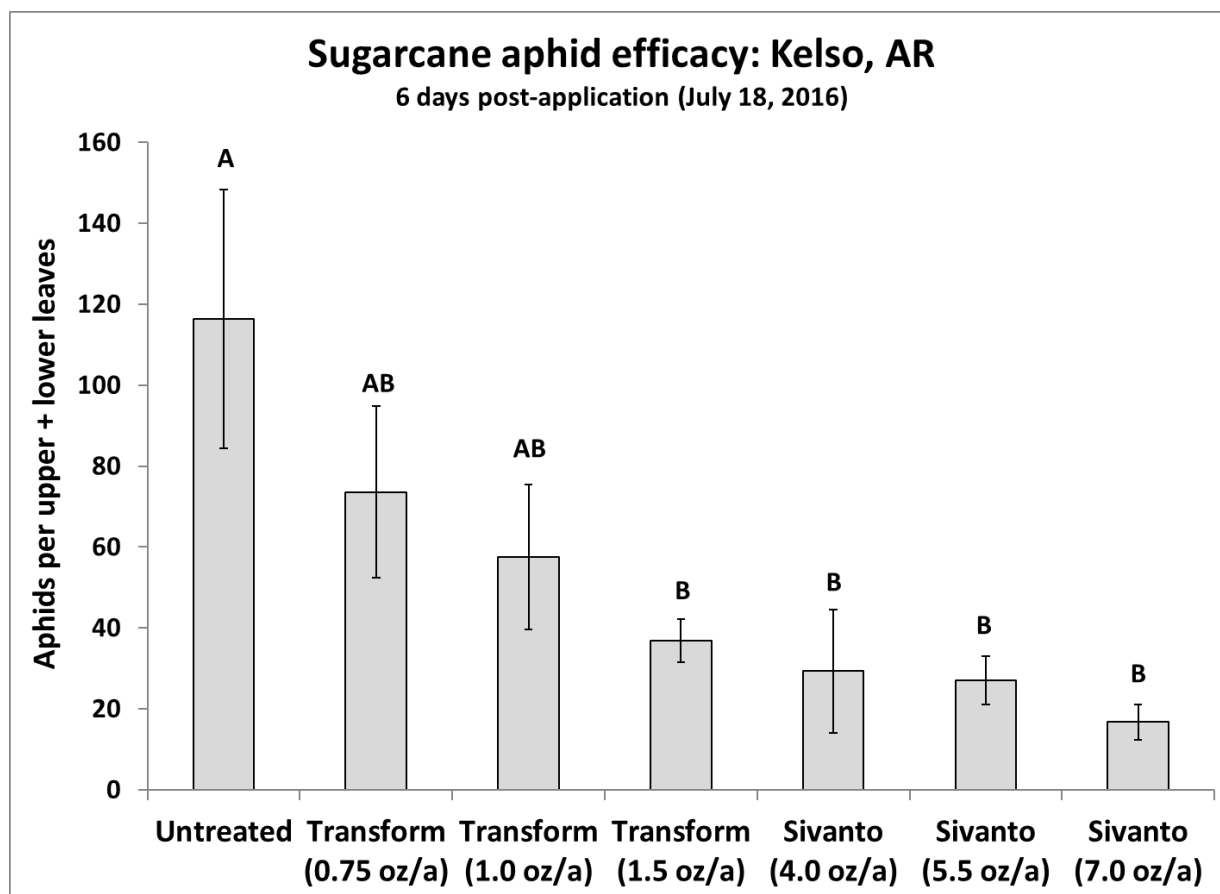


Fig. 1. Results of a field experiment conducted in southeast Arkansas in 2016 examining the performance of labeled insecticides for sugarcane aphid control in grain sorghum. Different letters above a column indicate differences in means based on the Fisher test of least significant difference ($\alpha = 0.05$).

SECTION 166.20(a)(6): EXPECTED RESIDUES FOR FOOD USES

Acute Assessment

Food consumption information from the USDA 1994-1996 and 1998 Nationwide Continuing Surveys of Food Intake by Individuals (CSFII) and maximum residues from field trials rather than

tolerance-level residue estimates were used. It was assumed that 100% of crops covered by the registration request are treated and maximum residue levels from field trials were used.

Drinking water. Two scenarios were modeled, use of sulfoxaflor on non-aquatic row and orchard crops and use of sulfoxaflor on watercress. For the non-aquatic crop scenario, based on the Pesticide Root Zone Model/Exposure Analysis Modeling System (PRZM/EXAMS) and Screening Concentration in Ground Water (SCI-GROW) models, the estimated drinking water concentrations (EDWCs) of sulfoxaflor for acute exposures are 26.4 ppb for surface water and 69.2 ppb for ground water. For chronic exposures, EDWCs are 13.5 ppb for surface water and 69.2 ppb for ground water. For chronic exposures for cancer assessments, EDWCs are 9.3 ppb for surface water and 69.2 ppb for ground water. For the watercress scenario, the EDWCs for surface water are 91.3 ppb after one application, 182.5 ppb after two applications and 273.8 ppb after three applications.

Dietary risk estimates using both sets of EDWCs are below levels of concern. The non-aquatic-crop EDWCs are more representative of the expected exposure profile for the majority of the population. Also, water concentration values are adjusted to take into account the source of the water; the relative amounts of parent sulfoxaflor, X11719474, and X11519540; and the relative liver toxicity of the metabolites as compared to the parent compound.

For acute dietary risk assessment of the general population, the groundwater EDWC is greater than the surface water EDWC and was used in the assessment. The residue profile in groundwater is 60.9 ppb X11719474 and 8.3 ppb X11519540 (totaling 69.2 ppb). Parent sulfoxaflor does not occur in groundwater. The regulatory toxicological endpoint is based on neurotoxicity.

For acute dietary risk assessment of females 13-49, the regulatory endpoint is attributable only to the parent compound; therefore, the surface water EDWC of 9.4 ppb was used for this assessment.

A tolerance of 0.3 ppm for sulfoxaflor on grain sorghum has been established. There is no expectation of residues of sulfoxaflor and its metabolites in animal commodities as a result of the proposed use on sorghum. Thus, animal feeding studies are not needed, and tolerances need not be established for meat, milk, poultry, and eggs.

Drinking water exposures are the driver in the dietary assessment accounting for 100% of the exposures. Exposures through food (sorghum grain and syrup) are zero.

The acute dietary exposure from food and water to sulfoxaflor is 16% of the aPAD for children 1-2 years old and females 13-49 years old, the population groups receiving the greatest exposure.

Chronic Assessment

The same refinements as those used for the acute exposure assessment were used, with two exceptions: (1) average residue levels from crop field trials were used rather than maximum values and (2) average residues from feeding studies, rather than maximum values, were used to derive residue estimates for livestock commodities. It was assumed that 100% of crops are treated and average residue levels from field trials were used.

For chronic dietary risk assessment, the toxicological endpoint is liver effects, for which it is possible to account for the relative toxicities of X11719474 and X11519540 as compared to sulfoxaflor. The groundwater EDWC is greater than the surface water EDWC. The residue profile in groundwater is 60.9 ppb X11719474 and 8.3 ppb X11519540. Adjusting for the relative toxicity results in 18.3 ppb equivalents of X11719474 and 83 ppb X11519540 (totaling 101.3 ppb). The adjusted groundwater EDWC is greater than the surface water EDWC (9.3 ppb) and was used to assess the chronic dietary exposure scenario.

The maximum dietary residue intake via consumption of sorghum commodities would be only a small portion of the RfD (<0.001%) and therefore, should not cause any additional risk to humans via chronic dietary exposure. Consumption of sorghum by sensitive sub-populations such as children and non-nursing infants is essentially zero. Thus, the risk of these subpopulations to chronic dietary exposure to sulfoxaflor used on grain sorghum would be insignificant.

The major contributor to the risk was water (100%). There was no contribution from grain sorghum to the dietary exposure. All other populations under the chronic assessment show risk estimates that are below levels of concern.

Chronic exposure to sulfoxaflor from food and water is 18% of the cPAD for infants, the population group receiving the greatest exposure. There are no residential uses for sulfoxaflor.

Short-term risk. Because there is no short-term residential exposure and chronic dietary exposure has already been assessed, no further assessment of short-term risk is necessary, the chronic dietary risk assessment for evaluating short-term risk for sulfoxaflor is sufficient.

Intermediate-term risk. Intermediate-term risk is assessed based on intermediate-term residential exposure plus chronic dietary exposure. Because there is no residential exposure and chronic dietary exposure has already been assessed, no further assessment of intermediate-term risk is necessary.

Cumulative effects. Sulfoxaflor does not share a common mechanism of toxicity with any other substances, and does not produce a toxic metabolite produced by other substances. Thus, sulfoxaflor does not have a common mechanism of toxicity with other substances.

Cancer. A nonlinear RfD approach is appropriate for assessing cancer risk to sulfoxaflor. This approach will account for all chronic toxicity, including carcinogenicity that could result from exposure to sulfoxaflor. Chronic dietary risk estimates are below levels of concern; therefore, cancer risk is also below levels of concern.

There is a reasonable certainty that no harm will result to the general population, or to infants and children from aggregate exposure to sulfoxaflor as used in this emergency exemption request.

The content in the above Section 166.20(a)(6): “Expected Residues For Food Uses” was prepared by Michael Hare, Ph.D., Texas Department of Agriculture.

SECTION 166.20(a)(7): DISCUSSION OF RISK INFORMATION

Human Health

Toxicological Profile

Sulfoxaflor is a member of a new class of insecticides, the sulfoximines. It is an activator of the nicotinic acetylcholine receptor (nAChR) in insects and, to a lesser degree, mammals. The nervous system and liver are the target organs, resulting in developmental toxicity and hepatotoxicity.

Developmental toxicity was observed in rats only. Sulfoxaflor produced skeletal abnormalities likely resulting from skeletal muscle contraction due to activation of the skeletal muscle nAChR in utero. Contraction of the diaphragm, also related to skeletal muscle nAChR activation, prevented normal breathing in neonates and increased mortality. The skeletal abnormalities occurred at high doses while decreased neonatal survival occurred at slightly lower levels.

Sulfoxaflor and its major metabolites produced liver weight and enzyme changes, and tumors in subchronic, chronic and short-term studies. Hepatotoxicity occurred at lower doses in long-term studies compared to short-term studies.

Reproductive effects included an increase in Leydig cell tumors which were not treatment related due to the lack of dose response, the lack of statistical significance for the combined tumors, and the high background rates for this tumor type in F344 rats. The primary effects on male reproductive organs are secondary to the loss of normal testicular function due to the size of the Leydig Cell adenomas. The secondary effects to the male reproductive organs are also not treatment related. It appears that rats are uniquely sensitive to these developmental effects and are unlikely to be relevant to humans.

Clinical indications of neurotoxicity were observed at the highest dose tested in the acute neurotoxicity study in rats. Decreased motor activity was also observed in the mid- and high-dose groups. Since the neurotoxicity was observed only at a very high dose and many of the effects are not consistent with the perturbation of the nicotinic receptor system, it is unlikely that these effects are due to activation of the nAChR.

Tumors have been observed in rat and mouse studies. In rats, there were significant increases in hepatocellular adenomas in the high-dose males. In mice, there were significant increases in hepatocellular adenomas and carcinomas in high dose males. In female mice, there was an increase in carcinomas at the high dose. Liver tumors in mice were treatment-related. Leydig cell tumors were also observed in the high-dose group of male rats, but were not related to treatment. There was also a significant increase in preputial gland tumors in male rats in the high-dose group. Given that the liver tumors are produced by a non-linear mechanism, the Leydig cell tumors were not treatment-related, and the preputial gland tumors only occurred at the high dose in one sex of one species, the evidence of carcinogenicity was weak.

Ecological Toxicity

Sulfoxaflor (N-[methyloxido[1-[6-(trifluoromethyl)-3-pyridinyl]ethyl]-lambda 4-sulfanylidene]) is a new variety of insecticide as a member of the sulfoxamine subclass of neonicotinoid insecticides. It is considered an agonist of the nicotinic acetylcholine receptor and exhibits excitatory responses including tremors, followed by paralysis and mortality in target insects.

Sulfoxaflor consists of two diastereomers in a ratio of approximately 50:50 with each diastereomer consisting of two enantiomers. Sulfoxaflor is systemically distributed in plants when applied. The chemical acts through both contact action and ingestion and provides both rapid knockdown (symptoms are typically observed within 1-2 hours of application) and residual control (generally provides from 7 to 21 days of residual control). Incident reports submitted to EPA since approximately 1994 have been tracked via the Incident Data System. Over the 2012 growing season, a Section 18 emergency use was granted for application of sulfoxaflor to cotton in four states (MS, LA, AR, TN). No incident reports have been received in association with the use of sulfoxaflor in this situation.

Sulfoxaflor is classified as practically non-toxic on an acute exposure basis, with 96-h LC₅₀ values of >400 mg a.i./L for all three freshwater fish species tested (bluegill, rainbow trout, and common carp). Mortality was 5% or less at the highest test treatments in each of these studies. Treatment-related sublethal effects included discoloration at the highest treatment concentration (100% of fish at 400 mg a.i./L for bluegill) and fish swimming on the bottom (1 fish at 400 mg a.i./L for rainbow trout). No other treatment-related sublethal effects were reported. For an estuarine/marine sheepshead minnow, sulfoxaflor was also practically non-toxic with an LC₅₀ of 288 mg a.i./L. Sublethal effects included loss of equilibrium or lying on the bottom of aquaria at 200 and 400 mg a.i./L. The primary degradate of sulfoxaflor is also classified as practically non-toxic to rainbow trout on an acute exposure basis (96-h LC₅₀ >500 mg a.i./L).

Adverse effects from chronic exposure to sulfoxaflor were examined with two fish species (fathead minnow and sheepshead minnow) during early life stage toxicity tests. For fathead minnow, the 30-d NOAEC is 5 mg a.i./L based on a 30% reduction in mean fish weight relative to controls at the next highest concentration (LOAEC=10 mg a.i./L). No statistically significant and/or treatment-related effects were reported for hatching success, fry survival and length. For sheepshead minnow, the 30-d NOAEC is 1.3 mg a.i./L based on a statistically significant reduction in mean length (3% relative to controls) at 2.5 mg a.i./L. No statistically significant and/or treatment-related effects were reported for hatching success, fry survival and mean weight.

The acute toxicity of sulfoxaflor was evaluated for one freshwater invertebrate species, the water flea and two saltwater species (mysid shrimp and Eastern oyster). For the water flea, the 48-h EC₅₀ is >400 mg a.i./L, the highest concentration tested. For Eastern oyster, new shell growth was significantly reduced at 120 mg a.i./L (75% reduction relative to control). The 96-h EC₅₀ for shell growth is 93 mg a.i./L. No mortality occurred at any test concentration. Mysid shrimp are the most acutely sensitive invertebrate species tested with sulfoxaflor based on water column only exposures, with a 96-h LC₅₀ of 0.67 mg a.i./L. The primary degradate of sulfoxaflor is also classified as practically non-toxic to the water flea (EC₅₀ >240 mg a.i./L).

The chronic effects of sulfoxaflor to the water flea were determined in a semi-static system over a period of 21 days to nominal concentrations of 6.25, 12.5, 25, 50 and 100 mg a.i./L. Adult mortality, reproduction rate (number of young), length of the surviving adults, and days to first brood were used to determine the toxicity endpoints. No treatment-related effects on adult mortality or adult length were observed. The reproduction rate and days to first brood were significantly ($p<0.05$) different in the 100 mg a.i./L test group (40% reduction in mean number of offspring; 35% increase in time to first brood). No significant effects were observed on survival,

growth or reproduction at the lower test concentrations. The 21-day NOAEC and LOAEC were determined to be 50 and 100 mg a.i./L, respectively.

The chronic effects of sulfoxaflor to mysid shrimp were determined in a flow-through system over a period of 28 days to nominal concentrations of 0.063, 0.13, 0.25, 0.50 and 1.0 mg a.i./L. Mortality of parent (F_0) and first generation (F_1), reproduction rate of F_0 (number of young), length of the surviving F_0 and F_1 , and days to first brood by F_0 were used to determine the toxicity endpoints. Complete F_0 mortality (100%) was observed at the highest test concentration of 1.0 mg a.i./L within 7 days; no treatment-related effects on F_0/F_1 mortality, F_0 reproduction rate, or F_0/F_1 length were observed at the lower test concentrations. The 28-day NOAEC and LOAEC were determined to be 0.11 mg and 0.25 mg a.i./L, respectively.

Sulfoxaflor exhibited relatively low toxicity to aquatic non-vascular plants. The most sensitive aquatic nonvascular plant is the freshwater diatom with a 96-h EC_{50} of 81.2 mg a.i./L. Similarly, sulfoxaflor was not toxic to the freshwater vascular aquatic plant, *Lemna gibba*, up to the limit amount, as indicated by a 7-d EC_{50} for frond count, dry weight and growth rate of >100 mg a.i./L with no significant adverse effects on these endpoints observed at any treatment concentration.

Based on an acute oral LD_{50} of 676 mg a.i./kg bw for bobwhite quail, sulfoxaflor is considered slightly toxic to birds on an acute oral exposure basis. On a subacute, dietary exposure basis, sulfoxaflor is classified as practically nontoxic to birds, with 5-d LC_{50} values of >5620 mg/kg-diet for mallard ducks and bobwhite quail. The NOAEL from these studies is 5620 mg/kg-diet as no treatment related mortality of sublethal effects were observed at any treatment. Similarly, the primary degradate is classified as practically nontoxic to birds on an acute oral exposure basis with a LD_{50} of >2250 mg a.i./kg bw. In two chronic, avian reproductive toxicity studies, the 20-week NOAELs ranged from 200 mg/kg-diet (mallard, highest concentration tested) to 1000 mg/kg-diet (bobwhite quail, highest concentration tested). No treatment-related adverse effects were observed at any test treatment in these studies.

For bees, sulfoxaflor is classified as very highly toxic with acute oral and contact LD_{50} values of 0.05 and 0.13 μ g a.i./bee, respectively, for adult honey bees. For larvae, a 7-d oral LD_{50} of >0.2 μ g a.i./bee was determined (45% mortality occurred at the highest treatment of 0.2 μ g a.i./bee). The primary metabolite of sulfoxaflor is practically non-toxic to the honey bee. This lack of toxicity is consistent with the cyano-substituted neonicotinoids where similar cleavage of the cyanide group appears to eliminate their insecticidal activity. The acute oral toxicity of sulfoxaflor to adult bumble bees (*Bombus terrestris*) is similar to the honey bee; whereas its acute contact toxicity is about 20X less toxic for the bumble bee. Sulfoxaflor did not demonstrate substantial residual toxicity to honey bees exposed via treated and aged alfalfa (i.e., mortality was <15% at maximum application rates).

At the application rates used (3-67% of US maximum), the direct effects of sulfoxaflor on adult forager bee mortality, flight activity and the occurrence of behavioral abnormalities is relatively short-lived, lasting 3 days or less. Direct effects are considered those that result directly from interception of spray droplets or dermal contact with foliar residues. The direct effect of sulfoxaflor on these measures at the maximum application rate in the US is presently not known. When compared to control hives, the effect of sulfoxaflor on honey bee colony strength when applied at

3-32% of the US maximum proposed rate was not apparent in most cases. When compared to hives prior to pesticide application, sulfoxaflor applied to cotton foliage up to the maximum rate proposed in the US resulted in no discernible decline in mean colony strength by 17 days after the first application. Longer-term results were not available from this study nor were concurrent controls included. For managed bees, the primary exposure routes of concern include direct contact with spray droplets, dermal contact with foliar residues, and ingestion through consumption of contaminated pollen, nectar and associated processed food provisions. Exposure of hive bees via contaminated wax is also possible. Exposure of bees through contaminated drinking water is not expected to be nearly as important as exposure through direct contact or pollen and nectar.

In summary, sulfoxaflor is slightly toxic to practically non-toxic to fish and freshwater aquatic invertebrates on an acute exposure basis. It is also practically non-toxic to aquatic plants (vascular and non-vascular). Sulfoxaflor is highly toxic to saltwater invertebrates on an acute exposure basis. The high toxicity of sulfoxaflor to mysid shrimp and benthic aquatic insects relative to the water flea is consistent with the toxicity profile of other insecticides with similar MOAs. For birds and mammals, sulfoxaflor is classified as moderately toxic to practically non-toxic on an acute exposure basis. The threshold for chronic toxicity (NOAEL) to birds is 200 ppm and that for mammals is 100 ppm in the diet. Sulfoxaflor did not exhibit deleterious effects to terrestrial plants at or above its proposed maximum application rates.

For bees, sulfoxaflor is classified as very highly toxic. However, if this insecticide is strictly used as directed on the Section 18 supplemental label, no significant adverse effects are expected to Illinois wildlife. Of course, standard precautions to avoid drift and runoff to waterways of the state are warranted. As stated on the Section 3 label, risk to managed bees and native pollinators from contact with pesticide spray or residues can be minimized when applications are made before 7 am or after 7 pm or when the temperature is below 55°F at the site of application.

Environmental Fate

Sulfoxaflor is a systemic insecticide which displays translaminar movement when applied to foliage. Movement of sulfoxaflor within the plant follows the direction of water transport within the plant (i.e., xylem mobile) as indicated by phosphor translocation studies in several plants. Sulfoxaflor is characterized by a water solubility ranging from 550 to 1,380 ppm. Sulfoxaflor has a low potential for volatilization from dry and wet surfaces (vapor pressure= 1.9×10^{-8} torr and Henry's Law constant= 1.2×10^{-11} atm m³ mole⁻¹, respectively at 25 °C). Partitioning coefficient of sulfoxaflor from octanol to water (K_{ow} @ 20 C & pH 7= 6; Log K_{ow} = 0.802) suggests low potential for bioaccumulation. No fish bioconcentration study was provided due to the low K_{ow} , but sulfoxaflor is not expected to bioaccumulate in aquatic systems. Furthermore, sulfoxaflor is not expected to partition into the sediment due to low K_{oc} (7-74 mL/g).

Registrants tests indicate that hydrolysis, and both aqueous and soil photolysis are not expected to be important in sulfoxaflor dissipation in the natural environment. In a hydrolysis study, the parent was shown to be stable in acidic/neutral/alkaline sterilized aqueous buffered solutions (pH values of 5, 7 and 9). In addition, parent chemical as well as its major degradate, were shown to degrade relatively slowly by aqueous photolysis in sterile and natural pond water ($t^{1/2}$ = 261 to >1,000 days). Furthermore, sulfoxaflor was stable to photolysis on soil surfaces. Sulfoxaflor is expected to

biodegrade rapidly in aerobic soil (half-lives <1 day). Under aerobic aquatic conditions, biodegradation proceeded at a more moderate rate with half-lives ranging from 37 to 88 days. Under anaerobic soil conditions, the parent compound was metabolized with half-lives of 113 to 120 days while under anaerobic aquatic conditions the chemical was more persistent with half-lives of 103 to 382 days. In contrast to its short-lived parent, the major degradate is expected to be more persistent than its parent in aerobic/anaerobic aquatic systems and some aerobic soils. In other soils, less persistence is expected due to mineralization to CO₂ or the formation of other minor degradates.

In field studies, sulfoxaflor has shown similar vulnerability to aerobic bio-degradation in nine out of ten terrestrial field dissipation studies on bare-ground/cropped plots (half-lives were <2 days in nine cropped/bare soils in CA, FL, ND, ON and TX and was 8 days in one bare ground soil in TX). The chemical can be characterized by very high to high mobility (K_{foc} ranged from 11-72 mL g⁻¹). Rapid soil degradation is expected to limit chemical amounts that may potentially leach and contaminate ground water. Contamination of groundwater by sulfoxaflor will only be expected when excessive rain occurs within a short period (few days) of multiple applications in vulnerable sandy soils. Contamination of surface water by sulfoxaflor is expected to be mainly related to drift and very little due to run-off. This is because drifted sulfoxaflor that reaches aquatic systems is expected to persist while that reaching the soil system is expected to degrade quickly with slight chance for it to run-off.

When sulfoxaflor is applied foliarly on growing crops it is intercepted by the crop canopy. Data presented above appear to indicate that sulfoxaflor enters the plant and is incorporated in the plant foliage with only limited degradation. It appears that this is the main source of the insecticide sulfoxaflor that would kill sap sucking insects. This is because washed-off sulfoxaflor, that reaches the soil system, is expected to degrade.

In summary, sulfoxaflor has a low potential for volatilization from dry and wet surfaces. This chemical is characterized by a relatively higher water solubility. Partitioning coefficient of sulfoxaflor from octanol to water suggests low potential for bioaccumulation in aquatic organisms such as fish. Sulfoxaflor is resistant to hydrolysis and photolysis but transforms quickly in soils. In contrast, sulfoxaflor reaching aquatic systems by drift is expected to degrade rather slowly. Partitioning of sulfoxaflor to air is not expected to be important due to the low vapor pressure and Henry's Law constant for sulfoxaflor. Exposure in surface water results from the drifted parent compound, and only minor amounts are expected to run-off only when rainfall and/or irrigation immediately follow application. The use of this insecticide is not expected to adversely impact Illinois ecosystems when used according to the Section 18 label. Of course, caution is needed to prevent exposure to water systems because of toxicity issues to aquatic invertebrates. As stated on the Section 3 label, this product should never be applied directly to water, to areas where surface water is present or to intertidal areas below the mean water mark. Also, the label includes the statement "Do not contaminate water when disposing of equipment rinsate."

Endangered and Threatened Species in Illinois

No impacts are expected on endangered and threatened species by this very limited use of this insecticide as delineated in the Section 18 application. Sulfoxaflor demonstrates a very favorable ecotoxicity and fate profile as stated above and should not directly impact any protected mammal,

fish, avian, or plant species. This product does adversely affect insects and aquatic invertebrates, especially bees, but the limited exposure to these species should not negatively affect endangered and threatened species in Illinois when applications follow the label precautions.

The above content in Section 166.20(a)(7): Discussion of Risk Information was, for the most part, prepared by Michael Hare, Ph.D. (Human Health Effects), David Villarreal, Ph.D. (Ecological Effects), and David Villarreal, Ph.D. (Environmental Fate), all with the Texas Department of Agriculture. The parts of the above content in this section, with references to Illinois, were prepared by the Illinois Department of Agriculture (IDA).

SECTION 166.20(a)(8): COORDINATION WITH OTHER AFFECTED STATE OR FEDERAL AGENCIES

Information regarding this Section 18 will be provided to the members of the Interagency Committee on Pesticides to inform them of the product that will be used in Illinois under the emergency exemption. Members include representatives from the University of Illinois, the Natural History Survey, and the state departments of Public Health, Transportation, Natural Resources, Environmental Protection, and Agriculture.

SECTION 166.20(a)(9): ACKNOWLEDGEMENT BY THE REGISTRANT

SECTION 166.20(a)(10): DESCRIPTION OF PROPOSED ENFORCEMENT PROGRAM

The Illinois Pesticide Act designates the Illinois Department of Agriculture, Bureau of Environmental Programs, as the state lead agency for the registration and regulation of pesticides. Through a Performance Partnership Grant with U.S. EPA, the provisions of the Federal Insecticide, Fungicide, and Rodenticide Act are administered. The Bureau is the state entity responsible for ensuring that the agricultural pesticide laws are complied with.

A final report will be submitted to EPA after the 2018 growing season for which the Section 18 specific exemption is requested. Enforcement staff at IDA will make use observations as needed and respond to misuse complaints.

SECTION 166.20(a)(11): REPEAT USES

The Illinois Department of Agriculture applied for this specific exemption in September 2015. Due to a federal court order limiting additional uses of sulfoxaflor, the exemption was not granted.

A specific exemption for sulfoxaflor was granted on July 19, 2016 for the 2016 growing season and was identified as 16-IL-01.

A request for this use was not made in 2017.

SECTION 166.20(b)(1): NAME OF THE PEST

Melanaphis sacchari

SECTION 166.20(b)(2): DISCUSSION OF EVENTS OR CIRCUMSTANCES WHICH BROUGHT ABOUT THE EMERGENCY SITUATION

The sugarcane aphid began infesting grain sorghum at economically damaging levels in the United States in 2013. Infestations in 2013 were limited to Texas, Oklahoma, Louisiana, and Mississippi. However, from 2014-2017 the distribution of economic infestations of sorghum expanded dramatically to threaten essentially all sorghum production areas of the U.S., including Illinois. The potential yield loss from this insect varies based on the timing of application, but up to 100% yield loss is possible if sorghum is infested during the vegetative stage. Potential yield losses in Illinois are likely to be lower than this on average, as infestations generally occur later in the season. Initially, no labeled insecticides were available that provided acceptable control of this insect. Section 18 exemptions for the use of Transform WG[®] were provided to several states when it was discovered that this material provided acceptable control of sugarcane aphid. Beginning in 2016, Sivanto Prime[®] received a 2(ee) recommendation for reduced rates of 4.0-7.0 oz/acre for control of sugarcane aphid in sorghum and pearl millet in Illinois. While this material has proven effective for control of sugarcane aphids, in Illinois there is a 21 day pre-harvest restriction for the use of this product in grain sorghum, compared with the 14 day pre-harvest restriction for use of Transform WG[®]. This restriction precludes the use of this product for late-season infestations that can interfere with harvest, a problem that has been noted to reduce harvest efficiency, damage equipment, and reduce yields up to 50% in Texas. Furthermore, because Sivanto Prime[®] is the only currently available insecticide for control of sugarcane aphid, the development of resistance to this product is a major concern. The availability of an additional material for control would reduce the potential selection pressure on sugarcane aphids to develop resistance to Sivanto Prime[®].

SECTION 166.20(b)(3): DISCUSSION OF ANTICIPATED RISKS TO ENDANGERED OR THREATENED SPECIES, BENEFICIAL ORGANISMS, OR THE ENVIRONMENT REMEDIED BY THE PROPOSED USE

No impacts are expected on endangered and threatened species by this limited use of this insecticide as delineated in the Section 18 application. Sulfoxaflor demonstrates a favorable ecotoxicity and fate profile as stated above and should not directly impact any protected mammal, fish, avian, or plant species. This product does adversely affect insects and aquatic invertebrates,

especially bees, but the limited exposure to these species should not negatively affect endangered and threatened species in Illinois when applications follow the label precautions.

SECTION 166.20(b)(4): DISCUSSION OF SIGNIFICANT ECONOMIC LOSS

1. Sugarcane aphid is capable of inflicting up to 100% yield losses at the individual field level, and further economic losses for grain sorghum producers in Illinois including decreases in harvest efficiency and damage to equipment.
2. Producers in southern Illinois, from counties such as Johnson and Williamson, have identified sugarcane aphid infestations during recent growing seasons.
3. Profitable markets for grain sorghum exist in southern Illinois that provide grain sorghum as a valued ingredient for regional pet food companies. These markets contribute to the net profitability of Illinois grain sorghum producer operations, particularly in southern Illinois.

Grain sorghum yield losses due to sugarcane aphid infestation vary depending on growth stage, but can reach up to 100% in fields that are infested at the late vegetative stages; severe injury at this stage prevents the grain head from exerting. Although the potential for yield reduction is reduced as the grain matures, infestations occurring as late as at harvest maturity can still be damaging. Infestations of sugarcane aphid during soft dough can cause up to 30% reductions in yield (Fig. 2). Infestations close to harvest can lead to mechanical difficulties and decreased harvest efficiency due to the buildup of sticky “honeydew” (the sugary waste product of the aphids) in the grain heads and on the foliage. A letter of support from the United Sorghum Checkoff is included.

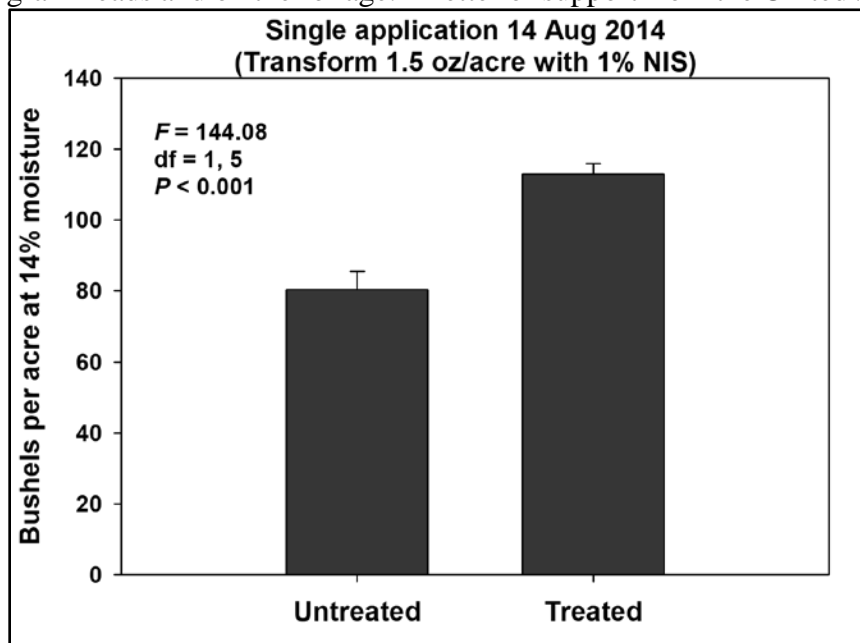


Fig. 2. Grain sorghum yields observed in a trial conducted near Rohwer, AR in 2014. A single application of Transform WG (1.5 oz/acre) was made during the soft dough stage of development.